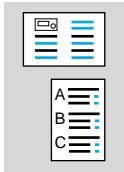


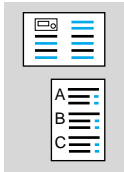
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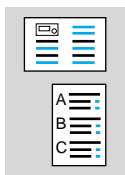
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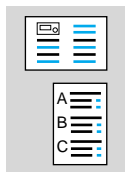


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Function Description

Caleo consists of a canopy, a display housing, a basic housing, an aggregate housing, and a trolley.



1 Caleo

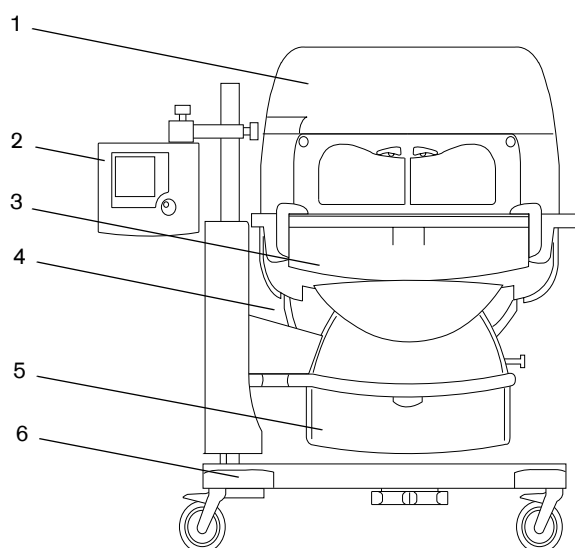


Fig. 1: Front view of the Caleo

Key

- 1 Canopy
- 2 Display housing
- 3 Basic housing
- 4 Aggregate housing
- 5 Drawer (optional)
- 6 Trolley
 - Non-adjustable trolley
 - Electrically adjustable trolley (optional feature)

1.1 Canopy

The canopy is a transparent acrylic cover. It is designed to sustain the set patient's environment. The canopy is mounted on column elements.

When the front door or the port doors are open, a warm air "curtain" ensures that the air temperature in the patient compartment does not decrease.

The canopy comprises a canopy cover, two large doors with hand ports, a movable double-wall, column elements, and two small doors with hose seals.

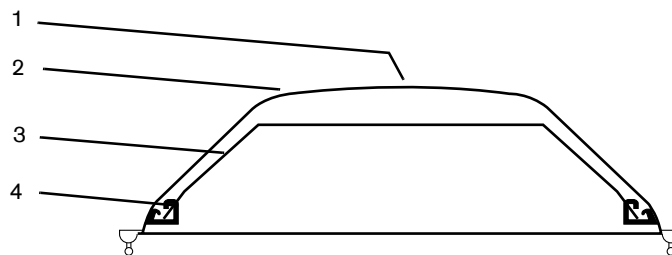
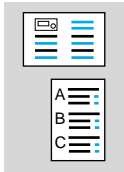


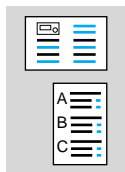
Fig. 2: Front view of the Caleo canopy

Key

- 1 Canopy cover
- 2 Large door with hand ports
- 3 Movable double-wall
- 4 Column elements
- Small door with hose seals

1.2 Sensor unit

The sensor unit is mounted on two column elements. The sensor unit measures the environment inside the patient compartment.



The sensor unit contains the following subassemblies:

- Housing
- WT2 Sensor PCB
- O2 Sensor PCB
- Alarm PCB with alarm light

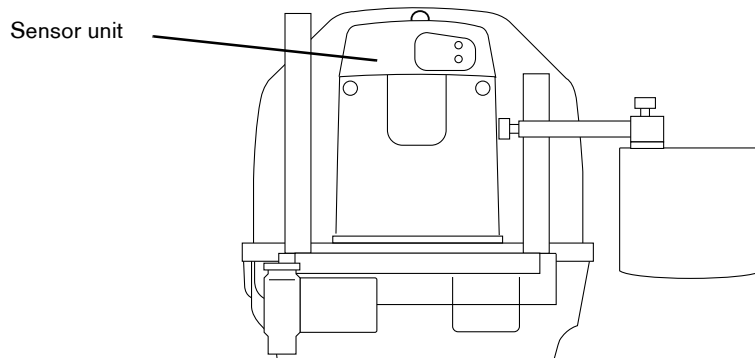


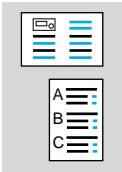
Fig. 3: Left view of Caleo

The sensor unit contains the following sensors:

- Air-temperature sensors
- Oxygen sensor(s) (optional)
- Second oxygen sensor for oxygen regulation (optional)
- Humidity sensor (optional)

1.2.1 WT2 Sensor PCB

The WT2 Sensor PCB measures the air temperature, skin temperature, humidity, and oxygen. These values are transmitted to the microcontroller of the WT2 Actuator PCB.



The WT2 Sensor PCB has the following subassemblies:

- Measurement of the patient's skin temperature
- Measurement of the air temperature and independent excess temperature monitoring
- Communication, A/D conversion, and electrical isolation

Measurement of the Skin Temperature

The control signals from the shift registers switch the individual skin-temperature measuring channels to the temperature hybrids. For the multiplexer to be able to test the skin-temperature measuring channels, it switches a parallel resistor to the respective skin-temperature measuring channel during operation.

The microcontroller of the WT2 Sensor PCB tests the accuracy of the temperature hybrids during the 10-minute test. To do so, a control signal is transmitted to a FET. Thus, the 36 °C resistor is switched to the input of the temperature hybrids.

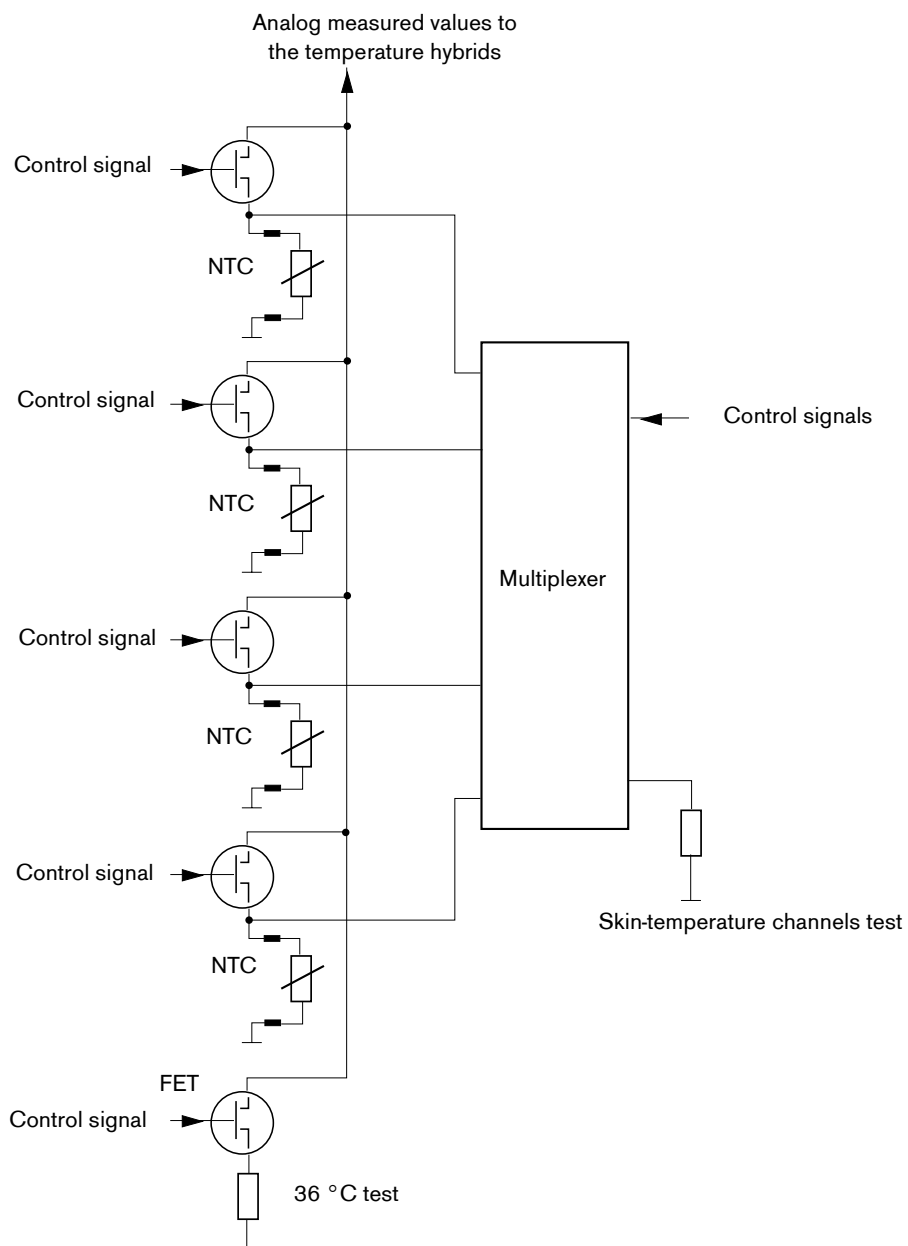


Fig. 4: Block diagram of the WT2 Sensor PCB, skin-temperature measurement

Measurement of the air temperature and independent excess temperature monitoring

The analog measured values of the air temperature reach temperature hybrid 1. The downstream excess-temperature comparator makes sure the air temperature in the patient compartment does not exceed 40.2 °C. If the air temperature is higher, a logic circuit on the WT2 Actuator PCB switches off the air heater.

During the 10-minute test, the excess-temperature test circuit simulates a temperature of 40.2 °C. During this period, the microcontroller monitors the function of the excess-temperature monitoring. An additional test circuit monitors also the air-temperature sensor 1.

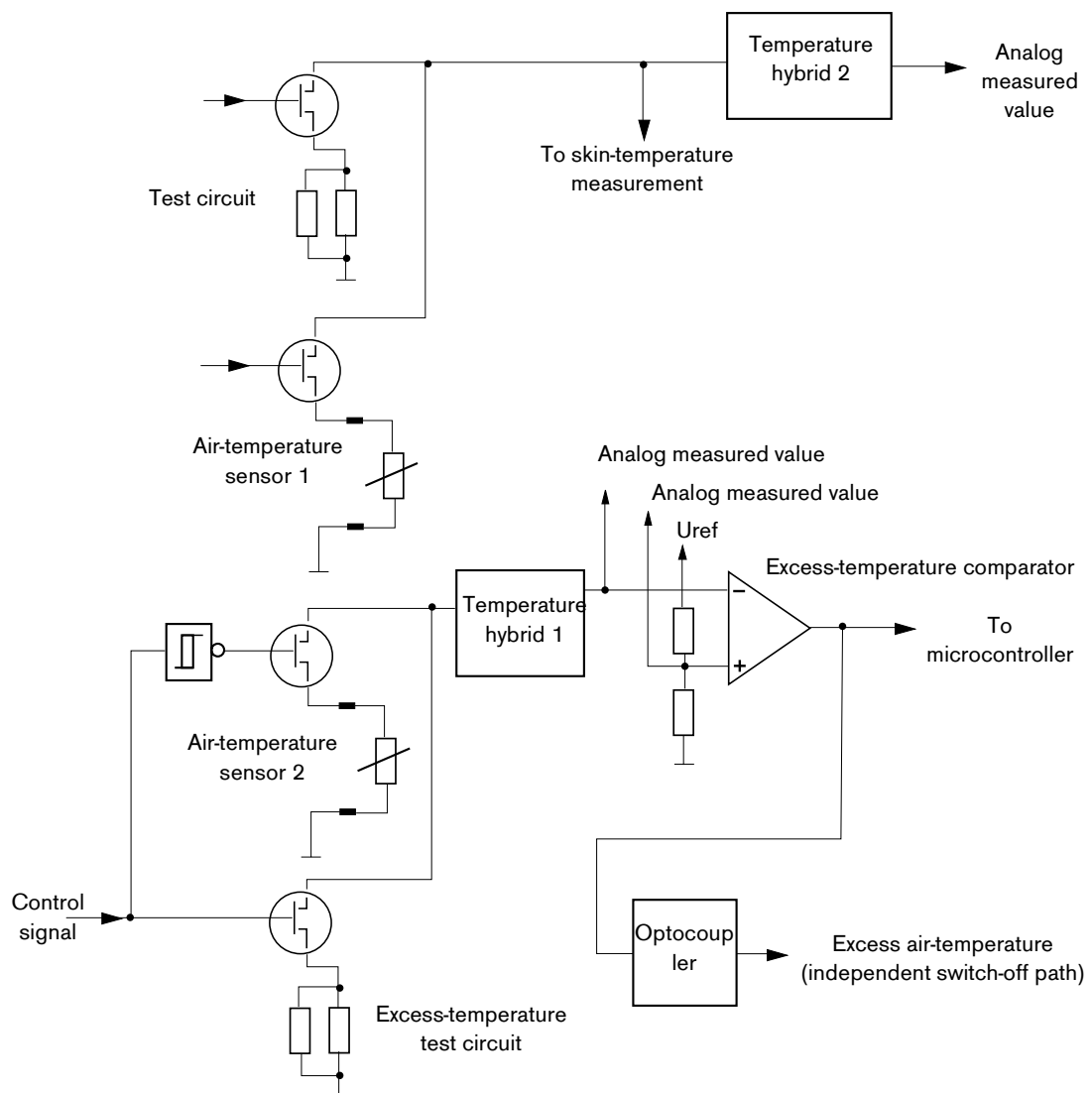
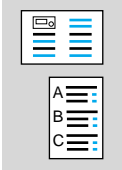


Fig. 5: Block diagram of the WT2 Sensor PCB, air-temperature measurement and independent excess-temperature monitoring

Communication, A/D conversion, and electrical isolation

The microcontroller controls and monitors the WT2 Sensor PCB functions.



A quartz clocks the microcontroller (with integrated CAN/RS232 interface) with a frequency of 8 MHz.

Shift registers use the SPI bus to control non-time-critical input and output connections.

The microcontroller has serial connections, input/output connections, interruptible connections, and analog input connections for measurement. Optocouplers electrically isolate the input and output signals. The integrated RS232 interface of the microcontroller connects the WT2 Sensor PCB with the O2 Sensor PCB. The microcontroller can switch on/off the O2 Sensor PCB.

The CAN bus driver connects the microcontroller with the WT2 Actuator PCB.

The DC/DC converter generates the 5 VISO voltage from the 5 V operating voltage.

An EEPROM stores board-specific data. A/D converter and EEPROM are controlled with the SPI bus. The A/D converter integrated in the microcontroller receives the signal from the independent excess-temperature monitoring.

The A/D converter measures the analog measuring signals (humidity (optional feature), air temperature, skin temperature, and 5 VISO voltage).

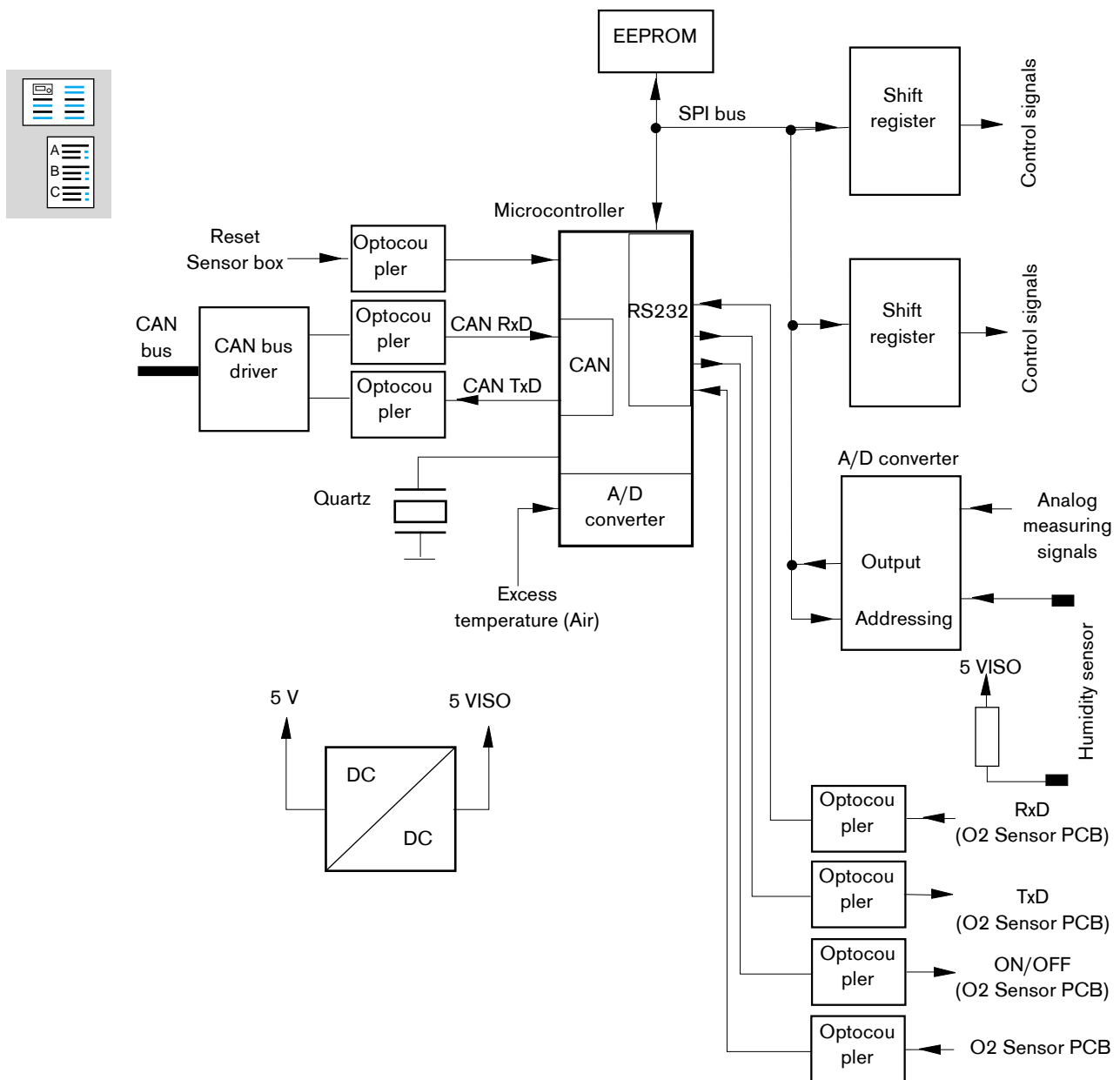


Fig. 6: Block diagram of the WT2 Sensor PCB (communication, A/D conversion, and electrical isolation)

1.2.2 O₂ Sensor PCB

The O₂ Sensor PCB receives the converted voltage from the oxygen sensor.

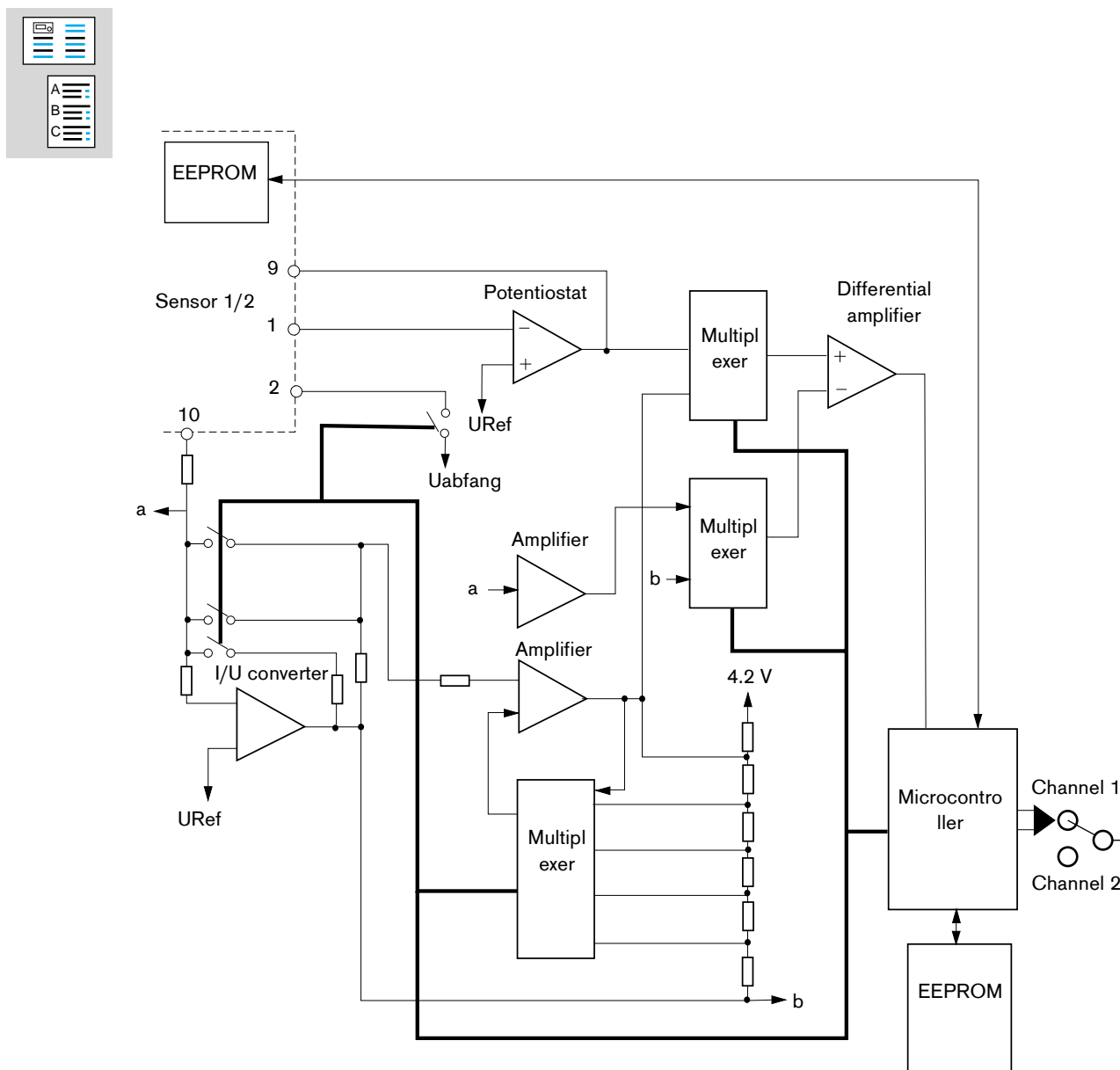
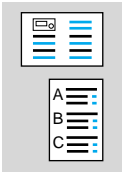


Fig. 7: Block diagram of the O₂ Sensor PCB

1.2.3 Skin-Temperature Sensor Socket

The skin-temperature sensor connectors are connected to the skin-temperature sensor sockets.



1.2.4 Skin-Temperature Sensors

Disposable skin-temperature sensors measure the patient's skin temperature.

1.2.5 Oxygen Measurement (optional)

Caleo is provided with an oxygen sensor for measurement of the oxygen content. The oxygen measurement range is 19 vol.% O₂ to 99 vol.% O₂. The microcontroller does not regulate the set oxygen value. Alarm limits can be adjusted or disabled completely.

1.2.6 Oxygen Regulation (optional)

The microcontroller compares the set oxygen value with the actual oxygen value. The microcontroller automatically adapts the actual oxygen value to the set oxygen value.

1.2.7 Humidity Sensor (optional)

The humidity sensor is mounted on the sensor unit. The humidity sensor measure the air humidity in the patient compartment.

1.2.8 Humidity Control (optional)

The performance value of the water boiler can be adjusted. However, the microcontroller does not readjust these performance values.

1.2.9 Humidity Regulation (optional)

The microcontroller compares the set performance values with the actual performance values of the water boiler. The microcontroller automatically adapts the actual performance values of the water boiler to the set performance values.

1.2.10 Alarm PCB with Alarm Light

The alarm light is mounted on the sensor unit. If an alarm occurs, the microcontroller on the WT2 Controller PCB triggers the alarm light.

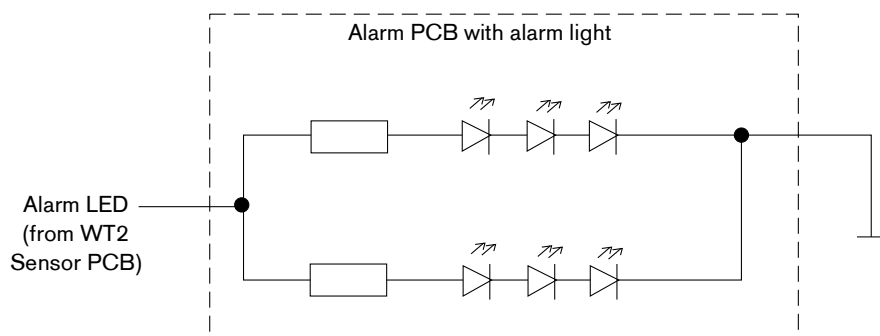
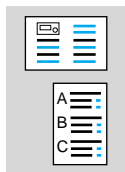
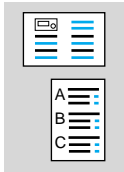


Fig. 8: Block diagram of Alarm PCB with alarm light

1.3 Display Housing

The display housing is Caleo's display and control unit.



Display housing



Fig. 9: Front view of the display housing

The display housing contains the following subassemblies:

- Housing
- Membrane keypad
- EL display (electroluminescent display)
- WT2 Controller PCB
- Lithium battery
- Shaft encoder with control knob
- Loudspeaker
- WT Interface PCB (optional)

1.3.1 Housing

The housing contains the membrane keypad, the EL display, the WT2 Controller PCB, the lithium battery, the shaft encoder with control knob, the loudspeaker, and the WT2 Interface PCB (optional).

1.3.2 Membrane Keypad

The membrane keypad has 12 keys and 7 LEDs. The membrane keypad is used to enter patient parameters. The LEDs on the keys indicate which function is currently selected.

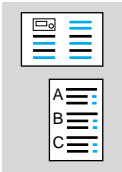


Fig. 10: View of the membrane keypad

1.3.3 EL Display (electroluminescent display)

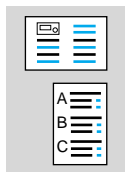
The EL display shows plain text messages. The EL display has a resolution of 320 x 240 pixels and adapts automatically to lighting conditions (brightness and contrast).

The EL display consists of an electroluminescent glass plate and the control electronics. An integrated DC/DC converter generates the operating voltages 5 VDC and 12 VDC.



Fig. 11: Front view of the EL display

1.3.4 WT2 Controller PCB



The WT2 Controller board, hereinafter called "WT2 Controller PCB", controls and monitors Caleo's functions. The CAN interface connects the microcontroller with the WT2 Actuator PCB.

In the event of a fault, the WT2 Controller PCB switches off consumers and an audible alarm sounds.

The WT2 Controller PCB comprises the following sub-assemblies/components:

- Microcontroller
- Quartz
- Read-only memory (ROM)
- EEPROM
- Flash PROM
- Random access memory (RAM)
- GoldCap evaluation
- Real-time clock (RTC)
- Lithium battery
- Powerfail oscillator
- Display controller
- LED control
- Keypad driver
- CAN controller and CAN driver
- Loudspeaker control
- Piezo alarm generator
- Counter (watchdog)
- Service interface
- Service LEDs

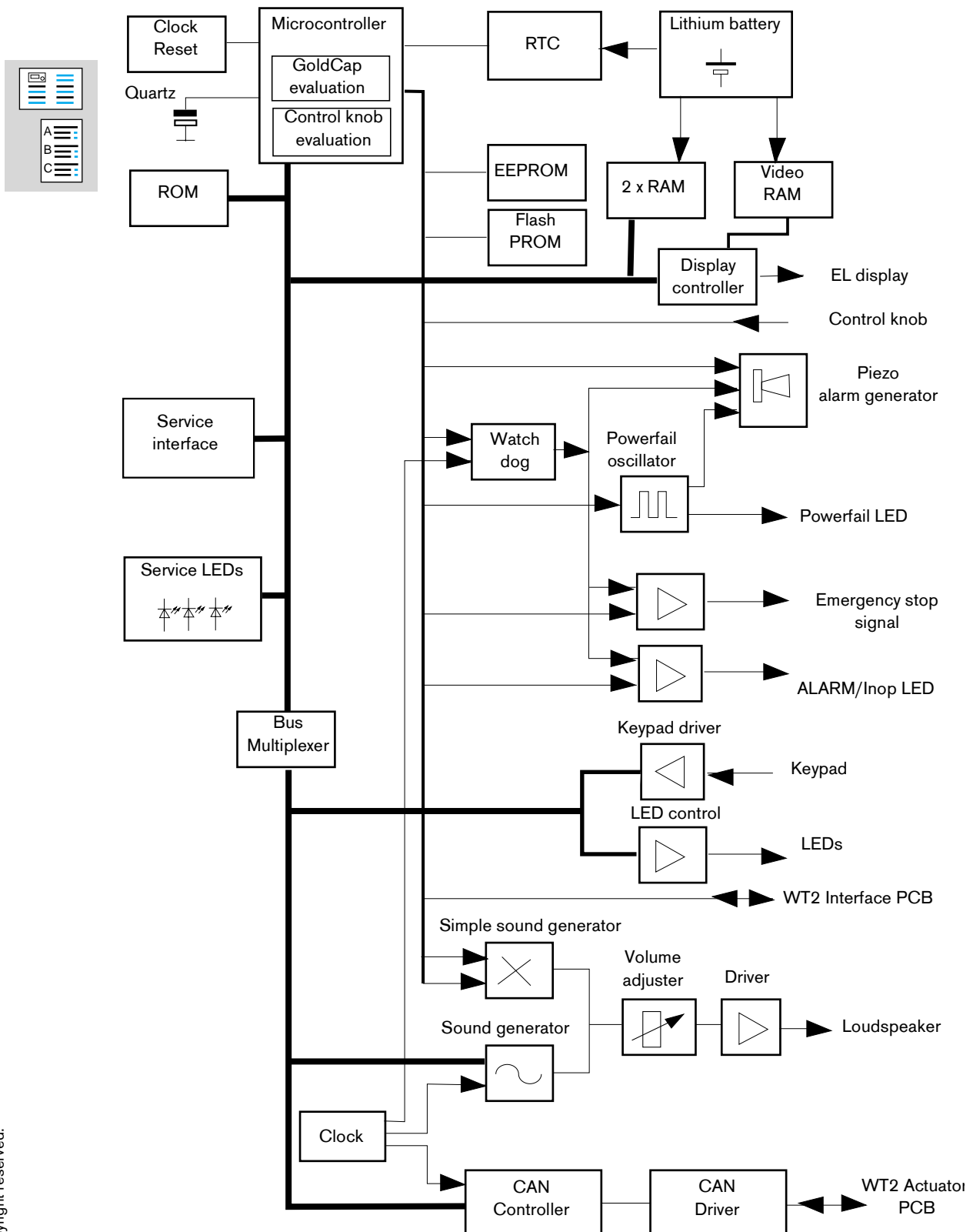
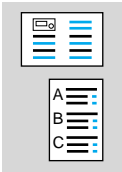


Fig. 12: Block diagram of the WT2 Controller PCB

Microcontroller



The microcontroller controls Caleo's functions. A quartz clocks the microcontroller with 32.768 kHz. The random-access memory (RAM) temporarily stores parameters for the microcontroller. The flash PROM contains the software program. The EEPROM contains the configuration data of the device. The microcontroller uses the control knob evaluation to read in the settings selected with the control knob. The microcontroller monitors that no voltage drop of the GoldCap capacitor occurs due to contact resistances in the wiring.

Real-Time Clock (RTC)

The RTC displays the correct time and date on the EL display.

Lithium Battery

When the device is switched off, the lithium battery powers the random-access memories (2x RAM and video RAM) and the RTC.

Powerfail Oscillator

The GoldCap capacitor powers the powerfail oscillator. If the mains voltage fails during operation, the powerfail oscillator generates an alarm and triggers the piezo alarm generator.

Display Controller

The display controller controls the EL display. The display controller consists of a programmable module, a display control module, and a data bus driver. The microcontroller provides the display controller with current data. In addition, trend data can be read out of the video RAM.

LED Control

The microcontroller controls the LEDs using transistors.

Keypad Driver

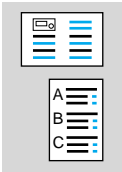
The microcontroller uses a driver module to read in keypad entries.

CAN Controller and CAN Driver

The CAN controller and the CAN bus driver connect the microcontroller with the WT2 Actuator PCB.

Loudspeaker Control

The microcontroller uses the sound generator to generate control signals. A series-connected driver preprocesses the signals for the loudspeaker. The software makes it possible to adjust the sound volume.



Piezo Alarm Generator

The operating voltage of the piezo alarm generator is +5 V. If the mains voltage fails, the GoldCap capacitor powers the piezo alarm generator. The piezo alarm generator makes it possible to generate audible alarms should the mains power or the device fail.

Counter (Watchdog)

The counter (watchdog) monitors the software program sequence of the microcontroller. The microcontroller resets the counter module at regular intervals (250 ms).

Service Interface Socket

A laptop computer can be connected to the service interface socket for servicing purposes.

Service LEDs

The service LEDs indicate the function of the microcontroller and of the keypad.

1.3.5 Loudspeaker

In the event of a failure, the loudspeaker emits an audible signal.

1.3.6 Shaft Encoder with Control Knob

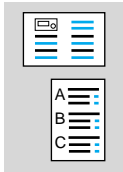
Turning the control knob will change the set patient parameters. Pressing the control knob will store the selected values or the device configurations.

1.3.7 WT2 Interface PCB (optional)

The WT2 Interface PCB makes it possible to create a connection between Caleo and a laptop computer. Integrated modules adjust the levels and isolate the connection.

1.4 Basic Housing

The basic housing is mounted on the wheeled frame. The mattress tray and the mattress are placed inside the basic housing.



The basic housing consists of the following parts: top side, base, drawer, intermediate element, air duct with sealing, and scales (optional).

1.4.1 Scales (optional)

Scales are used for weighing premature infants. The scales are operated from the display housing.

The scales comprise four weighing elements (1), which are located underneath the mattress tray, and the measuring and evaluation electronics.

The microcontroller stores the measured weight and displays it on the EL display. The trend display shows the measured weight of at least the last 5 days. The most recent weight is displayed in numerical format including the date of measurement. The weighing range is 0 to 10 kg.

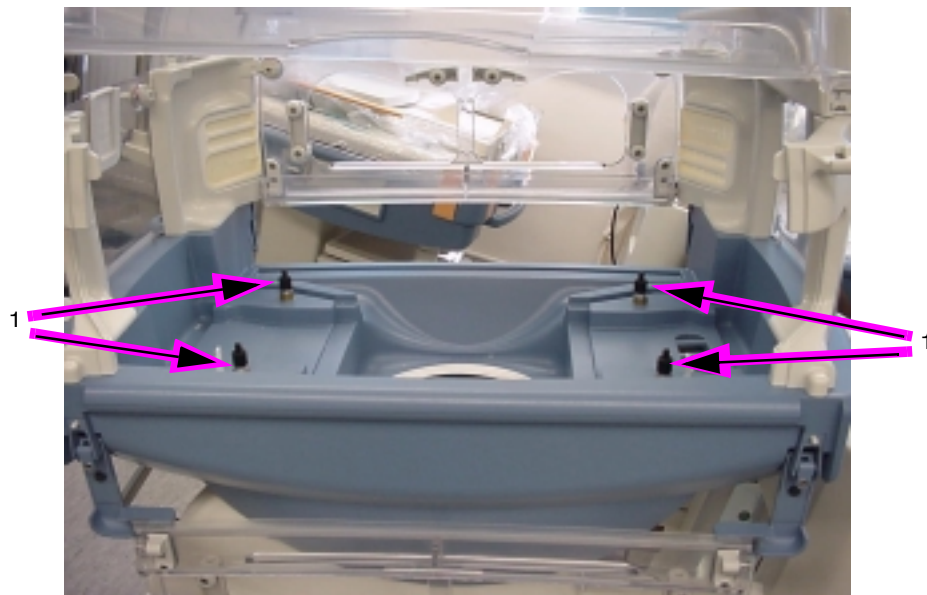
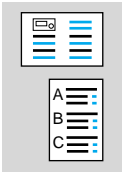


Fig. 13: Front view of Caleo, weighing elements

1.4.2 Mattress Tray

The mattress tray is made of plastic. The mattress tray is placed inside the basic housing.



Mattress

Caleo without mattress heater is equipped with a standard mattress.

1.4.3 Mattress Tray with Heating Foil (optional)

The mattress tray is provided with a heating foil. When the mattress tray heater is on, the heating foil is supplied with 24 V operating voltage. The heating foil heats up.



Always use a gel mattress when operating the unit with a mattress heater.

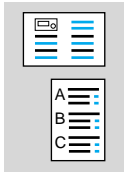
Mattress

Caleo with mattress heater is equipped with a gel mattress.

1.5 Water Container

The water container is mounted on the basic housing and has a filling volume of 2.3 L. The water container has specific colors which allow to see the current water level from the outside.

1.6 Aggregate Housing



The aggregate housing is located underneath the basic housing; it contains actuators and internal control elements.

The aggregate housing contains the following subassemblies:

- Toroidal-core transformer
- E-box
- Water boiler with float and thermo switches
- Air heater with heating element and thermo switches
- Air-temperature sensor
- Hall sensor
- Fan
- Filter box
- O₂ pneumatics control (optional)

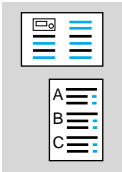
1.6.1 Toroidal-Core Transformer

The toroidal-core transformer transforms the mains input voltage into the following mains output voltages:

- 24 VAC
- 12 VAC

1.6.2 E-Box

The E-box comprises the E-box housing, the WT2 Actuator PCB and the WT2 Mattress PCB (optional feature).



E-Box Housing

The E-box housing protects the printed circuit board from external damage. The E-box housing contains the WT2 Actuator PCB and the WT2 Mattress PCB (optional feature).

WT2 Actuator PCB

The WT2 Actuator PCB controls and monitors functions.

The WT2 Actuator PCB comprises the following subassemblies:

- Communication
- Power Pack for Low Voltages
- Control and switch-off of air heater and water boiler
- Feedback signals from air heater and water boiler
- Monitoring and testing of air heater and water boiler
- Control and monitoring of adjustable column height and bed inclination
- Fan
- O₂ pneumatics
- Temperature measuring circuit

Communication

The microcontroller controls and monitors the WT2 Sensor PCB functions. A quartz clocks the microcontroller with 8 MHz. Shift registers use the SPI bus to control non-time-critical input and output connections. The EEPROM stores board-specific data. The memory area of the EEPROM is 1 kB.

The input and output connections (ports) of the microcontroller are assigned as follows:

- Serial input and output connections to the shift registers
- Input/output connections (Tx, Rx, CAN)
- Interruptible input connections (feedback signals)
- Analog measuring inputs

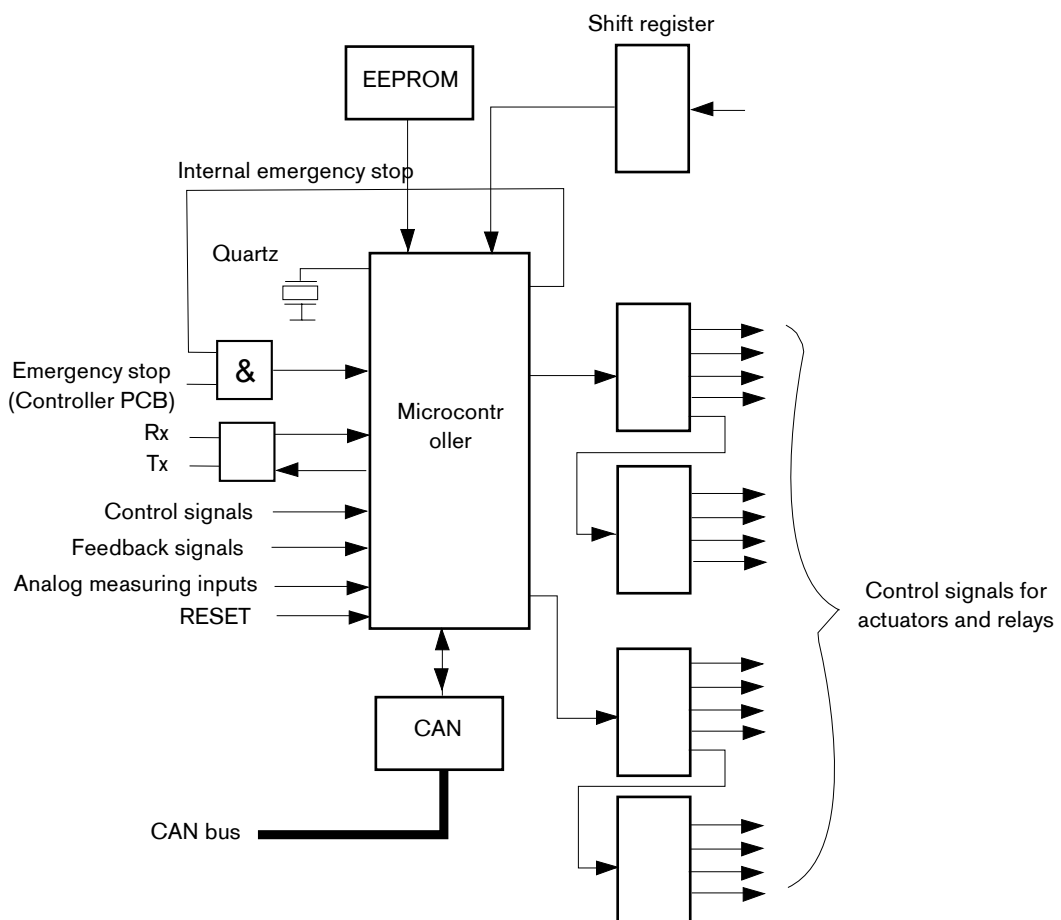
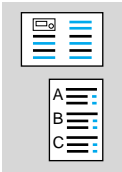


Fig. 14: Block diagram 2 of the WT2 Actuator PCB (communication)

Power Pack for Low Voltages

The secondary voltages of the toroidal-core transformer are present at the input of the WT2 Actuator PCB. Bridge-connected rectifiers rectify the secondary voltages. Capacitors filter and smooth the voltages. Voltage regulators stabilize the operating voltages.



The power pack generates the following operating voltages:

- 24 VACa and 24 VACb (external monitors)
- +24 VMOT (pulsating direct voltage for the height-adjustable column)
- +24 Vbr (unregulated direct voltage)
- +24 V (regulated direct voltage for O₂ valve and fan)
- +12 VMOT (unregulated direct voltage for the bed inclination drive)
- +12 Vel (15 V limited direct voltage for EL display; closing delay)
- +12 Vbr (unregulated direct voltage for relays)
- +5 V (regulated direct voltage for logic circuits)
- +5 V sensor (regulated direct voltage for sensors, power-limited: maximum current 0.35 A)
- GoldCapVCC (voltage for mains voltage failure alarm with GoldCap capacitor)

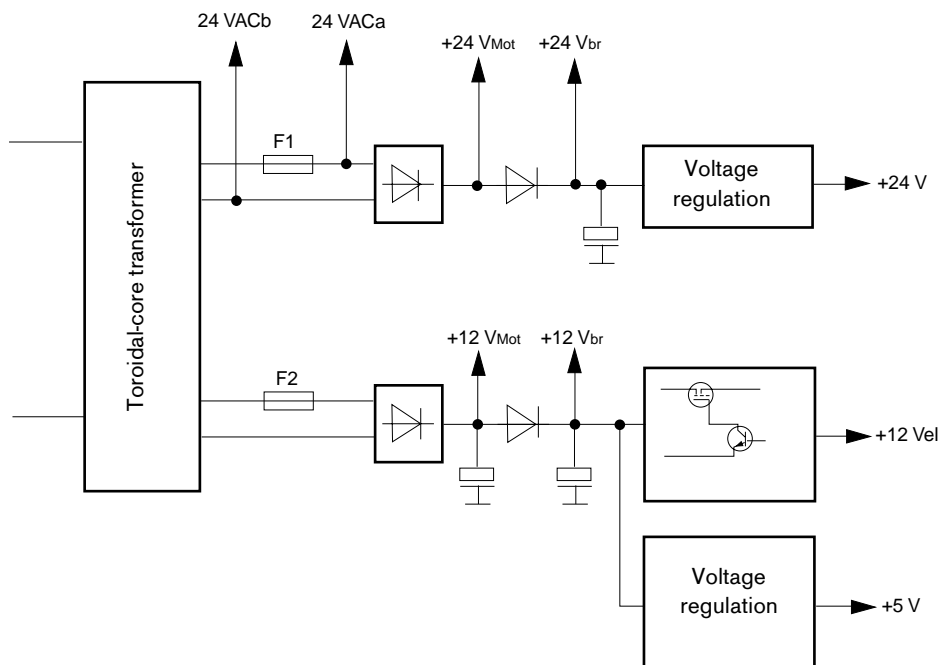


Fig. 15: Block diagram of the WT2 Actuator PCB (power pack for low voltages)

Air Heater Control, Switch-Off, and Feedback

The air heater is a mains-voltage-operated consumer (actuator).

A mains voltage relay switches one terminal of the mains voltage to the air heater. A triac at zero passage switches the other terminal of the mains voltage to the air heater. In the event of a fault, the mains voltage relay switches the mains voltage to the air heater off.

The control signal "Safety Relay (air heater)" and the signal "Excess Temperature (Air)" from the sensor box are logically connected by an AND gate. In the event of excess temperature in the patient's compartment of Caleo, the signal blocks the AND gate. The mains voltage relay is de-energized. No mains voltage is present at the air heater.

The mains voltage half waves present at the air heater generate pulses. The pulses reach an optocoupler. The optocoupler uses the pulses to generate a "Feedback Signal (air heater)" for the microcontroller.

A resistor-capacitor circuit is connected in parallel to the triac. When the safety relay is switched on and the air heater is no longer supplied with mains voltage, the resistor-capacitor circuit generates the signal "Feedback Signal (air heater)" in a test case.

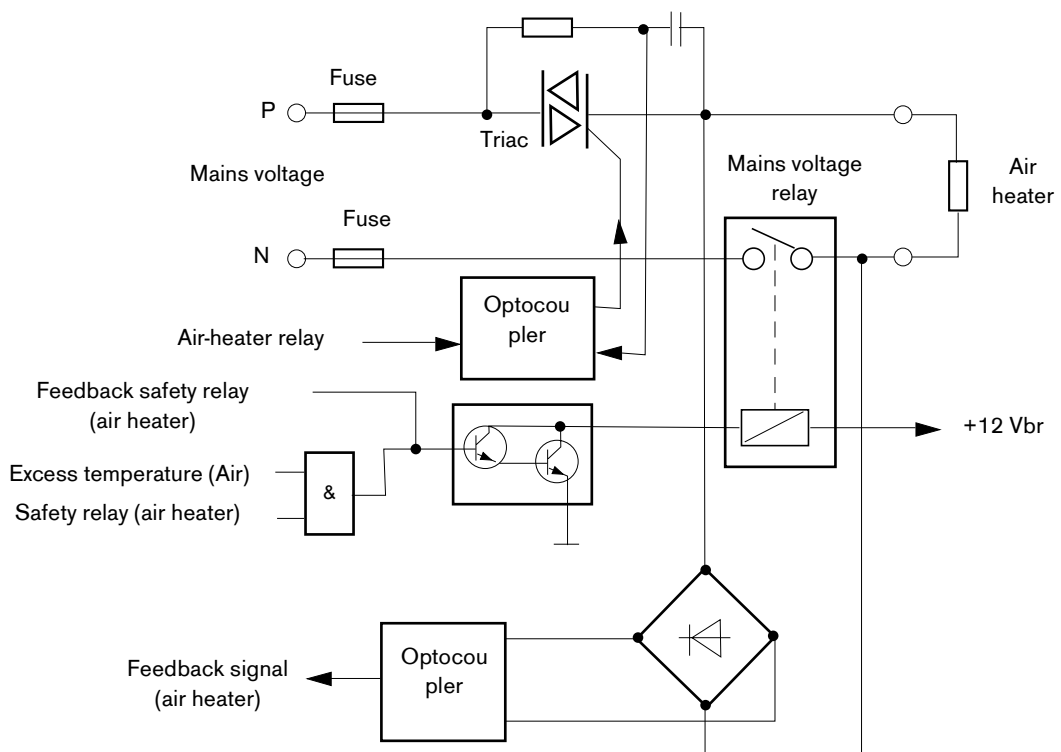


Fig. 16: Block diagram of the WT2 Actuator PCB (air heater control, switch-off, and feedback)

Water Boiler Control, Switch-Off, and Feedback

The water boiler is a mains-voltage-operated consumer (actuator).

A mains voltage relay switches one terminal of the mains voltage to the water boiler. A triac at zero passage switches the other terminal of the mains voltage to the humidifier. In the event of a fault, the mains voltage relay switches the mains voltage to the water boiler off.

The control signal "Safety Relay (water boiler)" and the signal "Excess Temperature (Air)" from the sensor box are logically connected by an AND gate. In the event of excess temperature in the patient's compartment of Caleo, the signal blocks the AND gate. The mains voltage relay is de-energized. No mains voltage is present at the water boiler.

The mains voltage half waves present at the water boiler generate pulses. The pulses reach an optocoupler. The optocoupler uses the pulses to generate a "Feedback Signal (water boiler)" for the microcontroller.

A resistor-capacitor circuit is connected in parallel to the triac. When the safety relay is switched on and the water boiler is no longer supplied with mains voltage, the resistor-capacitor circuit generates the signal "Feedback Signal (water boiler)" in a test case.

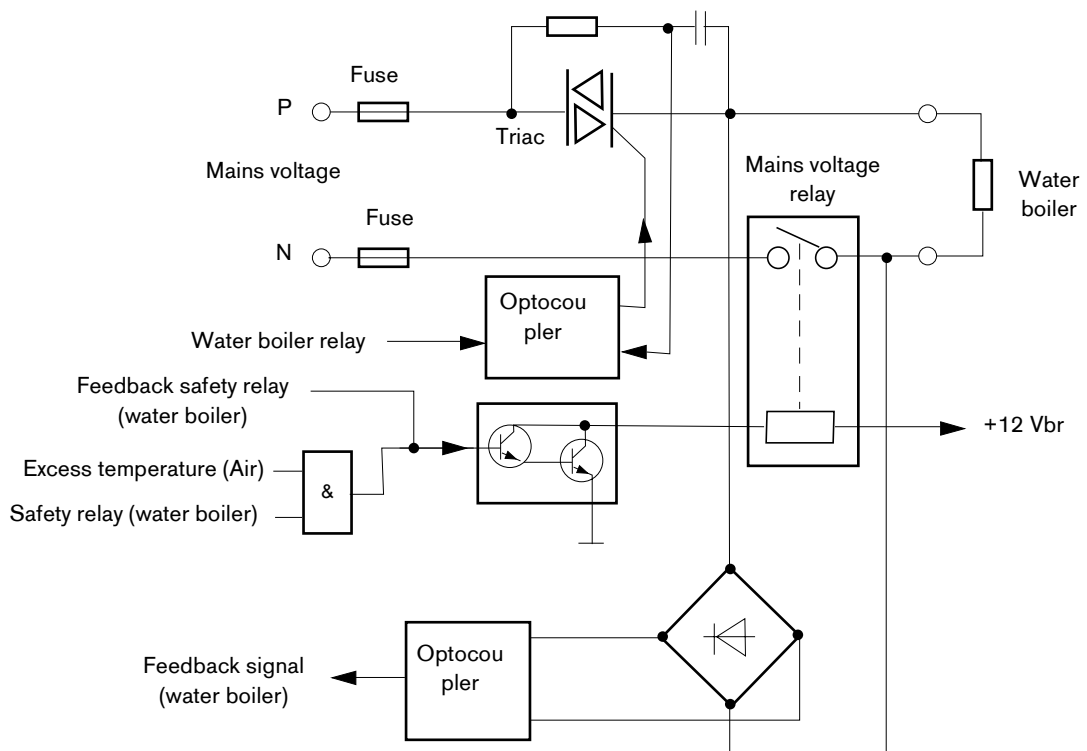
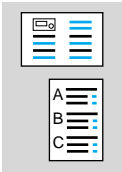


Fig. 17: Block diagram of the WT2 Actuator PCB (water boiler control, switch-off, and feedback)

Monitoring of the Air Temperature and Testing of the Air-Temperature Measuring Circuit



The microcontroller uses a temperature measuring circuit to monitor the maximum air temperature of the air heater. The temperature measuring circuit consists of two thermistors (NTC 1 + NTC 2; NTC = negative temperature coefficient). Series-connected field-effect transistors (FET NTC1 + FET NTC2) and operational amplifiers transmit the measured resistance changes to the microcontroller. The temperature range of the thermistors is 0 to 100 °C.

The microcontroller uses the transistor V1 to test the temperature measuring circuit. To do so, the microcontroller transmits the Signal "Test NTC1" to the transistor V1. The transistor V1 switches to passage and connects the test resistors to ground. The voltage drop is present at the microcontroller as analog value. This measurement allows the microcontroller to detect which channel is currently measuring. The reference resistors 1 to 3 make it possible to balance the circuit.

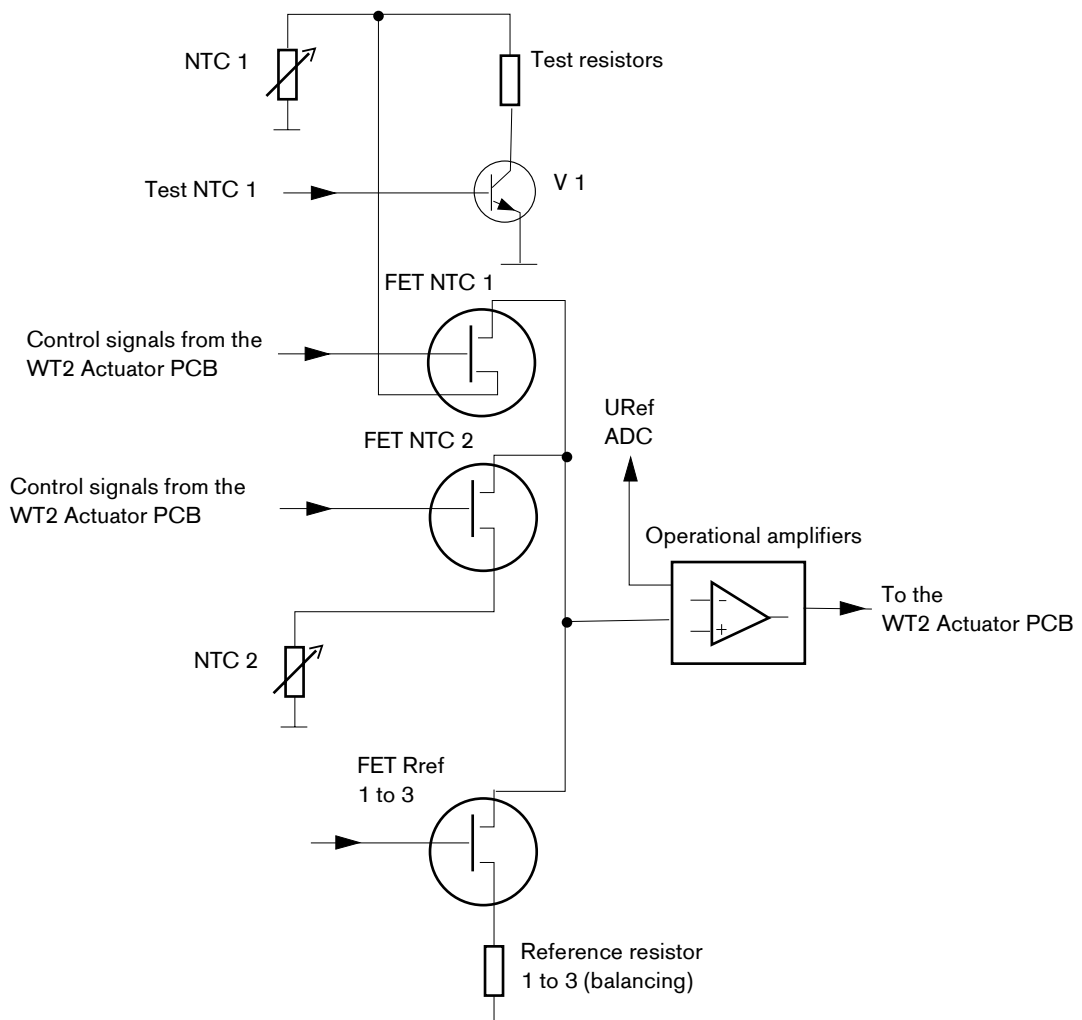
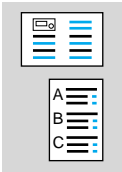


Fig. 18: Block diagram of the WT2 Actuator PCB (monitoring of the air temperature and testing of the air-temperature measuring circuit)

Monitoring of the water boiler (water failure)

The excess-temperature switch of the water boiler is connected to the microcontroller by means of an input connection. The microcontroller monitors the water failure thermo switch by scanning it at any time for its status (open/closed).



Fan Control and Monitoring

The FET (field-effect transistor) controls the fan with a +24 V operating voltage.

The fan wheel (contains two magnets) rotates a speed of 1500 rpm. A Hall sensor monitors the function. The two magnets on the fan wheel generate magnetic pulses. The Hall sensor converts these magnetic pulses to electrical signals. The output signal of the Hall sensor is switched to a counter module which is connected to an interruptible input connection of the microcontroller.

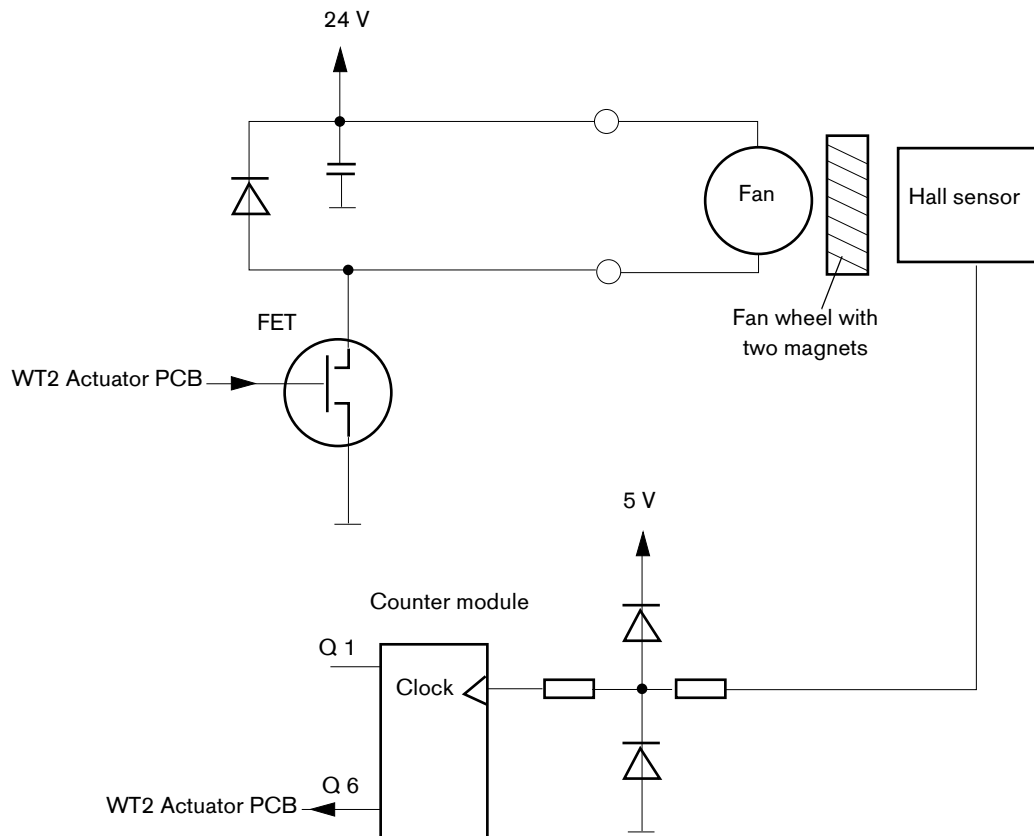
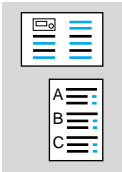


Fig. 19: Block diagram of the WT2 Actuator PCB (fan control and monitoring)

Bed Inclination Control and Monitoring



A measuring circuit measures the current which flows through the direct voltage motor. The microcontroller needs the analog output signal from the measuring circuit to monitor the direct voltage motor.

The comparator uses the analog output signal from the measuring circuit and the reference signal "Ref. Signal" from the microcontroller to generate the overload signal of the direct voltage motor. If the current present at the direct voltage motor is too high, an overload current circuit is stripped and the direct voltage motor is switched off. The signal "Inclination on" is logically connected to the overload signal of the direct voltage motor. The output signal is present at the FET 1 (field-effect transistor). The FET 1 activates the direct voltage motor. The bed is inclined to the left or right depending on which key is pressed. Two relays allow reversing the direction of the direct voltage motor.

Height-Adjustable Column (optional feature) Control and Monitoring

A measuring circuit measures the current which flows through the direct voltage motor. The microcontroller needs the analog output signal from the measuring circuit to monitor the direct voltage motor.

The comparator uses the analog output signal from the measuring circuit and the reference signal "Ref. Signal" from the microcontroller to generate the overload signal of the direct voltage motor. If the current present at the direct voltage motor is too high, an overload current circuit is stripped and the direct voltage motor is switched off. The signal "Height on" is logically connected to the overload signal of the direct voltage motor. The output signal is present at the FET 2 (field-effect transistor). The FET 1 activates the direct voltage motor. The work area moves up or down depending on the pedal used. Two relays allow reversing the direction of the direct voltage motor.

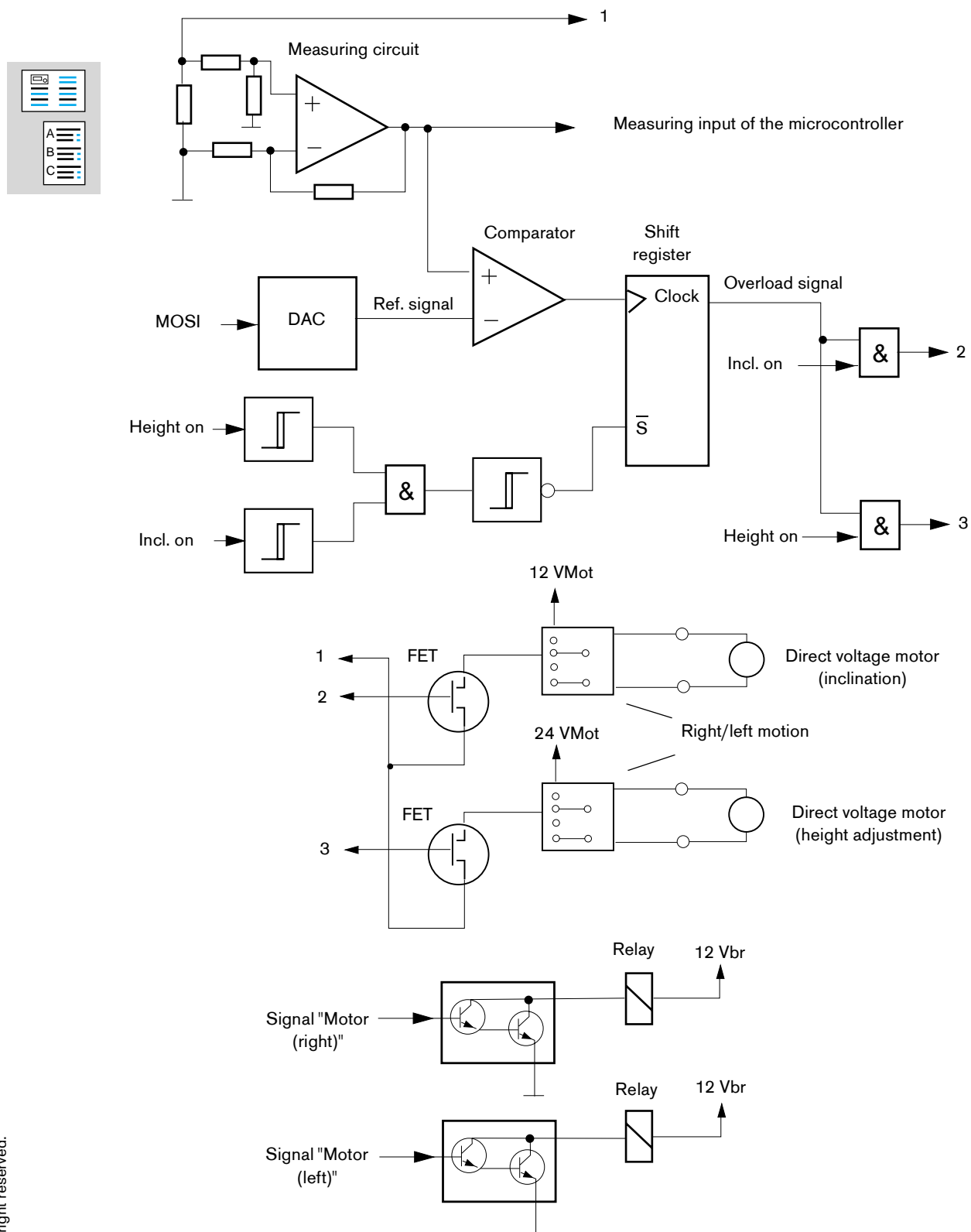


Fig. 20: Block diagram of the WT2 Actuator PCB (bed inclination/height adjustment control and monitoring)

O₂ Pneumatics (optional feature) Control and Monitoring

In the event of an oxygen demand, the microcontroller controls the FET (field-effect transistor). The FET becomes conductive and resists to switch the O₂ solenoid to ground. The O₂ solenoid switches. Oxygen flows to the patient.

The voltage drop at the resistors is the feedback signal for the microcontroller. The voltage drop corresponds to a current flow through the O₂ valve. Too high or too low a current flow is recognized as a fault by the microcontroller.

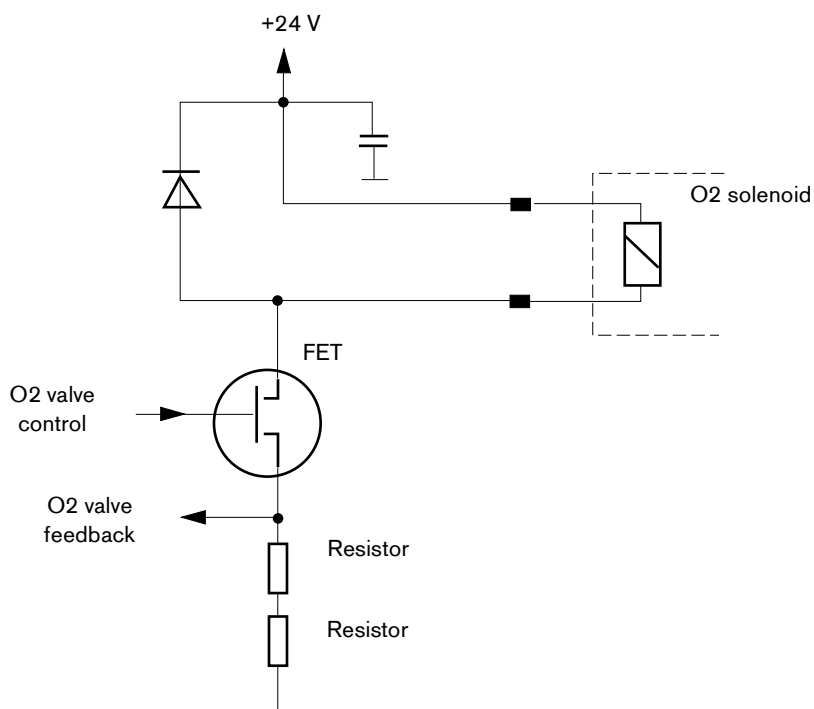
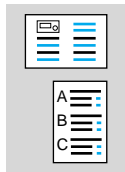
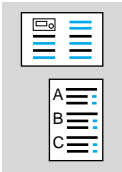


Fig. 21: Block diagram of the WT2 Actuator PCB (O₂ pneumatics (optional feature) control and monitoring)

GoldCap and Cold Start/Warm Start Detection



The on-off switch auxiliary contact closes after switching on the device. The GoldCap capacitor voltage is fed to the microcontroller through the on-off switch auxiliary contact. The microcontroller evaluates the voltage and detects whether the device has been switched on by a cold start or a warm start.

During operation, a charging circuit charges the GoldCap capacitor.

The microcontroller uses the Darlington transistor to switch off the charging circuit at defined intervals in order to check the GoldCap capacitor voltage. To do so, the microcontroller transmits the signal "GoldCap Test Signal" to the transistor. The transistor becomes conductive and switches the GoldCap voltage to ground using a resistor. The microcontroller inputs the voltage drop "GoldCap Measuring Signal" resulting at one resistor.

If the voltage drop is too low, the microcontroller shows an error message on the EL display.

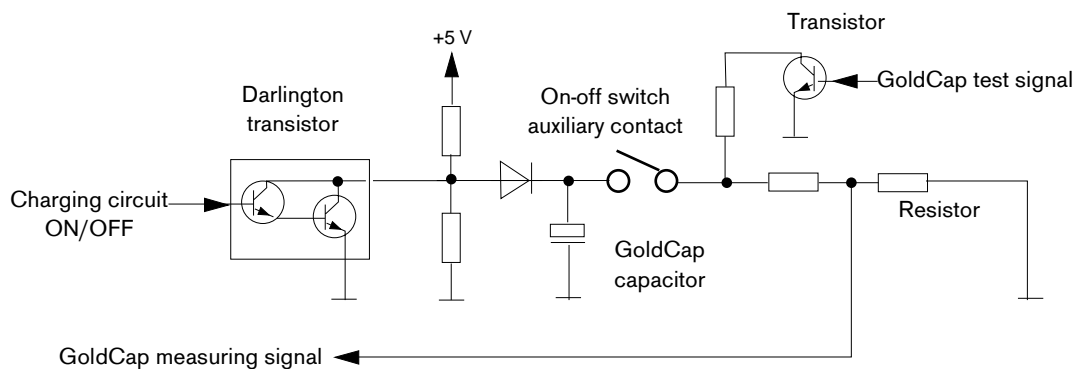
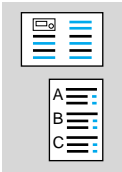


Fig. 22: Block diagram of the WT2 Actuator PCB (GoldCap and cold start/warm start detection)

Current Regulation and Testing of +5 V Sensor Voltage

The current regulating circuit measures the current that flows to the sensors. The current regulating circuit limits the current to a maximum of 350 mA.



To test the sensor voltage, the microcontroller deactivates FET 3 and activates FET 1 with the control signal. FET 1 switches to passage and generates a voltage drop at the resistor. The voltage drop is present at an analog input connection of the microcontroller. The microcontroller uses the re-input +5 V sensor voltage to test the circuit.

In the event of failure, the microcontroller uses the activation signal to switch FET 3 thereby switching off the +5 V sensor voltage.

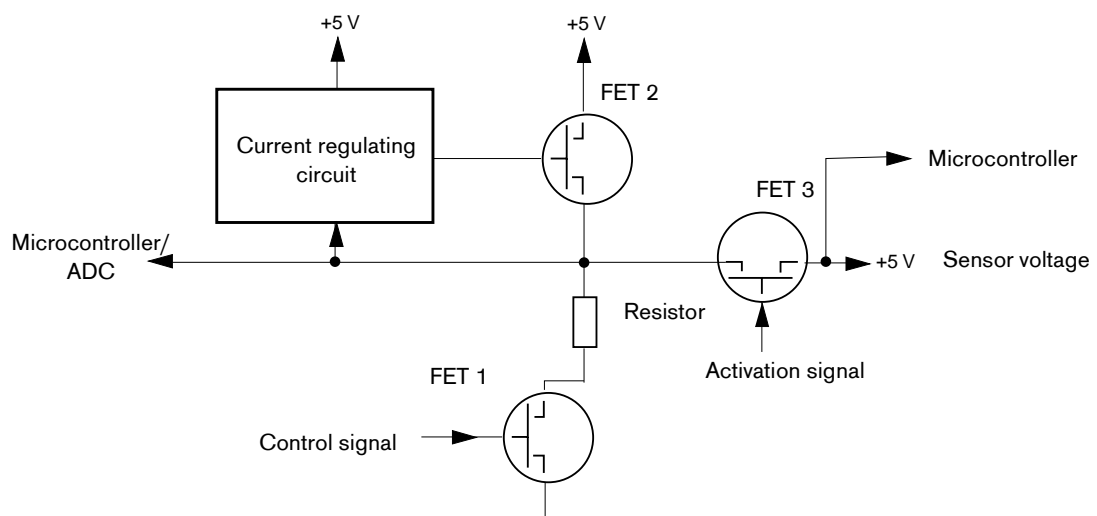
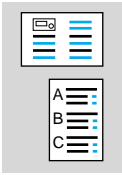


Fig. 23: Block diagram of the WT2 Actuator PCB (current limitation and testing of the +5 V sensor voltage)

1.6.3 Water Boiler with Float and Thermo Switches



The water boiler consists of the water level control, the boiler including heating cartridge, and three thermo switches (2x thermo soldering switches, 1x thermo switch).

The water boiler humidifies the air inside the patient compartment of Caleo. The water boiler is powered from the connected mains voltage.

The water boiler is fused with two-pole fuses.

A resistor/capacitor circuit is connected in parallel to the triac. This makes it possible to carry out an earth leakage current measurement.

1.6.4 Air Heater with Heating Element and Thermo Switches

The air heater with heating element has two soldering thermo switches. The air heater has a circular form. Lamellar heating elements allow a good heat distribution. The connected mains voltage powers the air heater.

The air heater is fused with two-pole fuses.

A resistor/capacitor circuit is connected in parallel to the triac. This makes it possible to carry out an earth leakage current measurement.

1.6.5 Air-temperature sensor

The air-temperature sensor measures the temperature of the air heater. The microcontroller switches the air heater off as soon as it reaches the maximum permissible temperature.

1.6.6 Hall Sensor

The Hall sensor converts the magnetic signals from the fan wheel with magnets into electrical signals.

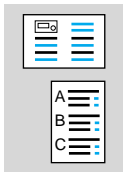
1.6.7 Fan

The operating voltage of the fan is +24 V. Power input during operation is 0.25 A. The fan is mounted in the center of the aggregate housing. Surrounded by the air heater, the fan wheel moves the heated air into the patient compartment of Caleo.

The motor is mounted on four silicone supports. The silicone supports hold the fan in a fixed position. Due to their special design, the silicone supports make sure the noise is kept at a low level. The speed of the fan is approximately 1500 rpm.

1.6.8 Filter Box

The filter box filters the ambient air taken in. The filter box consists of the filter frame, the filter mount, and the fresh-air filter.



1.6.9 Water Connection Tube

The water connection tube connects the water container and water tube with the body of the water level controller.

1.6.10 O₂ Pneumatics Control (optional)

The O₂ pneumatics consists of the O₂ valve and the O₂ pressure reducer. The oxygen control (O₂ control) is carried out with O₂ sensors. The O₂ sensors are installed in the sensor box.

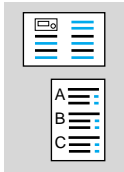
The O₂ valve is a solenoid. The operating voltage of the solenoid is +24 V. The holding voltage of the solenoid is 16 V.

1.6.11 O₂Adapter DISS/NIST

The compressed-gas tube is connected to the O₂ adapter DISS/NIST.

1.7 Trolley

Caleo is available with different trolleys:



- non-adjustable trolley
- electrically adjustable trolley (optional)

1.7.1 Non-adjustable Trolley

The size of the mattress tray of the non-adjustable trolley (height) is 85/95/105 cm.

Direct Current Motor for Inclination

The direct current motor for the inclination function is mounted between the trolley and the basic housing. The direct current motor is powered with an operating voltage of +12 V.

Trolley Electronics

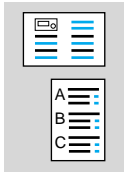
The trolley electronics comprises the integrated multiple socket-outlet, mains voltage fuses, sockets for non-heating apparatus, on/off switch, and WT2 Mains PCB.

The WT2 Mains PCB has the following subassemblies:

- On/off switch
- Mains filter
- Autotransformer circuitry

1.7.2 Electrically Adjustable Trolley (optional)

The mattress tray height can be adjusted. The lift speed is 8 to 12 mm/s. The start and stop behavior is without shock.



Direct Current Motor for Inclination

The direct current motor for the inclination function is mounted between the trolley and the basic housing. The direct current motor is powered with an operating voltage of +12 V.

Direct Voltage Motor for Height Adjustment

The height adjustment direct current motor is powered with an operating voltage of +24 V.

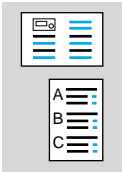
Pedals

Pedals with integrated switches (optional) on the front and on the back can be used to move the mattress tray up or down.

Trolley Electronics

The trolley electronics comprises the integrated multiple socket-outlet, mains voltage fuses, sockets for non-heating apparatus, on/off switch, and WT2 Mains PCB.

1.8 Secretion Suction Device



The secretion suction device is supplied with compressed gas (oxygen or air). The display on the display housing shows the vacuum value. The switch for the secretion suction device is located on the basic housing.

The secretion suction device has the following connections

- NIST for oxygen
- DISS for oxygen (with DIN/NIST adapter): Air/O₂

The secretion suction power is 0.5 bar.

1.9 Oxygen Cylinder Holder

The oxygen cylinder holder is mounted on the bottom plate. The oxygen cylinder holder holds the oxygen cylinder in place on the trolley.

The oxygen cylinder is used for the following:

- secretion suction
- oxygen enrichment
- operation with a separate ventilator (manual breathing bag)

1.10 Monitor Supporting Plate

The monitor supporting plate has a load-carrying capacity of 11 kg. It has a surface of 25 cm x 25 cm.

The monitor supporting plate can be mounted at two different heights:

- at mattress tray level
- above the upper edge of the canopy

1.11 Interfaces

Caleo has the following interfaces:

- Service interface to download new software
- 2x RS232 for printer (CWO) or ext. monitor and phone diagnosis (optional)
- Nurse call outlet port (optional)